

Lab-on-a-Robot Platform for In-Situ Planetary Compositional Analysis, Phase II

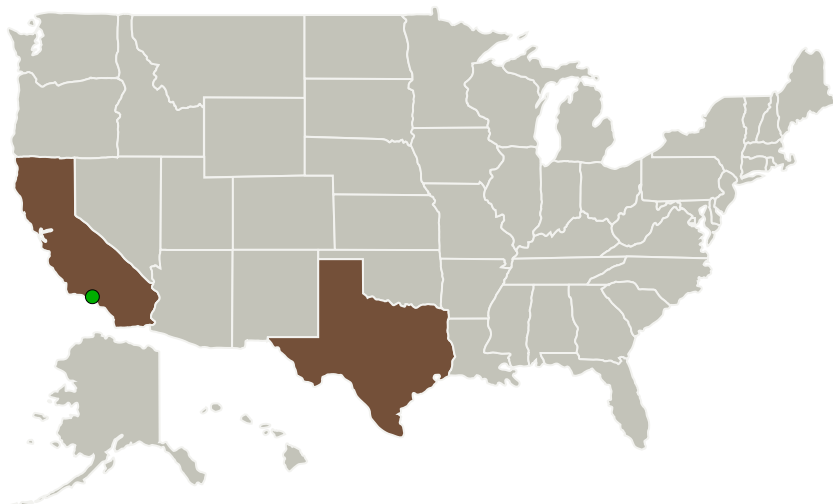
Completed Technology Project (2013 - 2016)



Project Introduction

This joint STTR research effort between HJ Science & Technology and the University of Texas at San Antonio seeks to establish a highly integrated mobile "lab-on-a-chip" platform – next generation "lab-on-a-robot" (LOAR) - capable of in-situ, high throughput, and simultaneous identification and characterization of universal classes of ions, molecules, and biomolecules for NASA in-situ planetary compositional analysis, and planetary and small body surface chemistry studies. The technology combines programmable microfluidic on-chip automation of sample processing, microchip capillary electrophoresis with contactless conductivity and optical detections, and integration with the next generation LOAR mobile platform in a miniaturized format. Such a mobile platform for the miniaturized instrument will lay the groundwork for future NASA in situ robotic missions. In Phase I, we have established the technical feasibility by demonstrating all key functionalities. This includes the separation and detection of selective ions that are relevant to the aqueous chemistry and reactivity of the Martian surface material with a novel microfab-less microfluidic device and the demonstration of the on-chip automated sample processing capability with a novel microvalve platform. The Phase II effort will include expanding and enhancing the performance capability of the novel microfab-less microfluidic device, integrating the on-chip automation technology to the microfluidic device and demonstrate the capability of the programmable on-chip automation of sample processing, and the design, construction, and test of a next generation LOAR prototype.

Primary U.S. Work Locations and Key Partners



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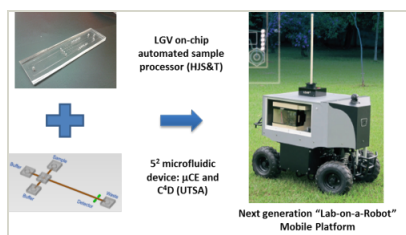


Organizations Performing Work	Role	Type	Location
HJ Science & Technology, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Berkeley, California
● Jet Propulsion Laboratory (JPL)	Supporting Organization	NASA Center	Pasadena, California
The University of Texas at San Antonio (UTSA)	Supporting Organization	Academia	San Antonio, Texas

Primary U.S. Work Locations

California	Texas
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Images



Briefing Chart

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(<https://techport.nasa.gov/image/134450>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

HJ Science & Technology, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Hong Jiao

Co-Investigator:

Hong Jiao

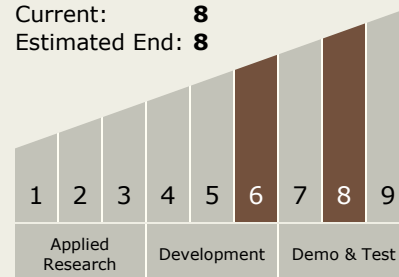
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Technology Maturity (TRL)

Start: 6
Current: 8
Estimated End: 8



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System